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ABSTRACT

This investigation of delivery systems for continuing professional education provides an overview of current operational delivery systems in continuing professional education, drawing on experience as found in the literature. Learning theories and conclusions are woven into the descriptive text. Delivery systems profiled in the paper include the following: distance, self-directed learning, lecture, correspondence, professional journal, audiotape, telephone, computer, and television (satellite transmission, cable television, closed circuit television, microwave transmission, videotape, and videodisc). A chart comparing the advantages of each type of delivery system is included in the report. Forty-one references are listed. (KC)

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DELIVERY SYSTEMS

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Purpose

The fivefold mission of the Office of Continuing Professional Education includes:

- Advocacy: to serve as an advocate for continuing professional education within the University context through the development of innovative approaches to continuing learning for professionals.
- Linkage: to build linkages between the University's academic departments and its continuing education program development and delivery units in order to foster a coordinated, comprehensive response to the increasingly important issue of continuing education for professionals.
- Collaboration: to serve as a catalyst for the establishment and maintenance of collaborative relationships between the University and professional associations so that the expertise of educators and practitioners can be combined to produce more effective learning experiences for professionals.
- Consultation: to examine, explore, and share alternative strategies for identifying professionals' learning needs and for evaluating continuing professional education programs in order to assist academic departments and faculty members in better addressing the educational challenges posed by professionals' continual need to update their skills and knowledge.
- Research: to conduct action research on issues related to continuing professional education in order to better understand and provide solutions to the complex problems underlying the ongoing education of practicing professionals.

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CONTINUING PROFESSIONAL EDUCATION

DELIVERY SYSTEMS

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April, 1987

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INTRODUCTION

This investigation of delivery sytems for continuing professional education was not intended to be a definitive study. Adequately probing the depths of such an intricate subject, one formed by a nexus of complex factors, would require an undertaking of sizeable proportions. Rather, this paper attempts to provide an overview of current operational delivery systems in continuing professional education, drawing on experience as found in the literature. Learning theories and conclusions are woven into the descriptive text.

The literature that was tracked specifically addressed delivery systems for continuing professional education, since professionals constitute a unique type of learner upon which delivery may impact differently than on other learners. In addition, the sheer mass of general material on delivery systems is of a proportion equal to a tome-sized undertaking. Most of the articles dealing expressly with delivery for continuing professional education can be characterized as "how I done it good" tales supported by participant surveys. Some took on a proselytizing tone, expressing enthusiasm if not ecstasy about the success of their particular delivery system. Much of the evidence and many viewpoints presented conflicted with other writers' conclusions, but that is to be expected of an amorphous topic with few absolutes. At any rate, some of the descriptive experiences found in the literature are included in the following pages for the enlightenment they may provide. The subject of educational delivery to professionals is in its pupal stage, certain to emerge as a topic of major importance as continuing professional education climbs to prominence in the educational establishment. Perhaps research and successful application of delivery systems in continuing professional education can break down the prejudicial barriers toward instructional technology found in its progenitor, higher education.

BACKGROUND

"You must always be students", Joseph Lister admonished an assembly of physicians over a century ago, "learning and unlearning 'till your life's end. If you are not prepared to follow your profession in this spirit, I implore you to leave its rank and betake yourself to some third-class trade" (Oakley, 1983). Although continuing professional education has long been considered an integral part of the professional milieu, the importunity created of late by the knowledge explosion, technological advances, and a crisis in public confidence have thrust a more formal approach on the concept (Houle, 1980; Schon, 1983). Correspondingly, innovations in media now offer educators a virtual Disneyland of choices for program delivery. But continuing professional education is too important and too replete with nuances to simply address with gizmos and gadgets. Its program delivery is an issue to be decided by a number of factors which in turn influence hardware choice.

HARDWARE

A tempting but oft noted pitfall frequently waylaying those responsible for program delivery is termed the "media trap". Simply, this refers to an obsession with delivery mechanics rather than learning objectives. Fancy gadgetry has squandered scarce resources and emasculated complex instructional packages. Sadly, the most efficient educational operations have made the fatal financial mistake of not planning for the replacement of equipment, even the most durable of which has a relatively short life expectancy (Wager, 1977). And, no matter how sophisticated the state-of-the-art in hardware, software development invariably remains a step behind. As one instructional

specialist notes, "When we push the button and turn the machine on, the program that's on the machine is pretty modest" (Fink, 1983). Emerging among the more established delivery systems of seminars, journals, audio conferencing, and correspondence are marvelous telemediums such as microwave video, which links broadcast sites; interactive video, which permits learner involvement; teletext, which brings print onto the television screen; and videodisc, a fascinating telemedium capable of augmenting video visuals with computer learning programs. Learning often can be facilitated by proper use of these media, but choice of delivery system should not be influenced by the enchanting lure of high-tech alone.

LEARNING STYLE

Which delivery system to use is a question exacerbated by the problem that no one learning style suits every individual. Unfortunately, definitive knowledge on learning styles is very limited. Emphasis on developments in high-tech and to some extent, better teaching, have outstripped research in helping students discover better ways to learn (Bennett, 1984). Wager (1977) observes that since college students are sophisticated learners capable of synthesizing abstract symbols into knowledge, the impact of alternative delivery systems is insignificant. Knirk and Gustafson (1986) note the inability of research to uncover disparity in learning effectiveness between traditional and media-based instruction, concluding that students "tend to learn as effectively from instructional media as from teacher-based systems" (p. 158). It seems to follow that the professional, as a product of higher education, also would be unaffected by delivery mode. Delivery is, of course, an issue quite different from learning style. Participatory, problem-oriented

learning situations, in which the difficult decisions professionals encounter are discussed and analyzed, are recognized as the most meaningful educational encounters for professionals (Brookfield, 1986; Knowles, 1985). This type of interactive learning experience can be accomplished through any of a number of delivery systems (Hoyt & Frye, 1972; Spencer, 1986). A few years ago, the Continuing Education Committee of the Association for the Advancement of Behavior Therapy (AABT) conducted a participant evaluation of the Association's five-hour continuing professional education institute which precedes the organization's annual conference. The purpose of the evaluation was to assess the impact of traditional pedagogical teaching versus "active" teaching employing video demonstrations and role play. Evaluations yielded a negative correlation for traditional pedagogy but a positive response for active teaching methods (Clark, 1983).

DISTANCE DELIVERY

In addition to considering problem-oriented, participatory learning as a foundation for continuing professional education, other factors such as cost and time impact on choice of delivery system. Unlike traditional modes of education, the greatest cost in continuing education is in the delivery process itself (Grosslight, 1985). It has been estimated that costs of travel, food, lodging, and tuition have doubled since 1980, sparking interest in cost-effective alternative delivery over the traditional seminar format (Showalter, 1983; Polk, 1984). A survey of professionals from five allied health fields revealed that the greatest impediments to seminar participation were distance and cost (Broski and Upp, 1979). Rural areas in particular are problematic for both continuing professional education providers and

professionals. Rural professionals find it time-consuming and inconvenient to journey afar in search of continuing professional education, and providers are reluctant to offer programs in areas unlikely to engender enrollments (Clark, 1983). Concessions in delivery systems employed may be necessary to facilitate access (Spencer, 1986).

Among the trends in continuing professional education listed by Haughey (1983), two are striking in their potential impact on delivery systems: growing interest in space-free, time-free learning, and increasing demand for self-directed learning with a focus on specific topics.

Dunn (1985) notes that, if properly developed, self-directed distance learning can increase practitioner participation in continuing professional education. He listed eight criteria essential to the success of distance learning in any medium:

- convenient: accessible in home or office
- attractive: pleasantly designed, appealing to the eye
- concise: incremental doses of information
- relevant: practice-oriented educational material
- individualized: capable of adaptation to individual needs
- self-assessment: allows practitioners to determine their learning needs
- areas of speculation: must consider value judgments required of professionals
- systematic: structured, built around needed competencies

SELF-DIRECTED LEARNING

Dunn emphasizes the importance of a tutorial organization to provide the learner planning advice, guidance, support, and feedback. The criteria he

lists are not simply characteristics of sound delivery to remote learners, but are applicable to independent study as well in the emerging concept of self-directed learning. Still in the pioneering stage, structural self-directed learning is a response to the effectiveness of "sub rosa" learning experiences among professionals (Osborne, 1984; Richards, 1984; Goldfinger and Bennett, 1983).

Five separate surveys conducted in the last decade reveal that reading and discussions with colleagues are methods most frequently used by physicians in upgrading their practices (Richards, 1984). Similarly, a survey of behavior therapists found that books, journals, and discussions with colleagues were the most frequently used sources of continuing education (Clark, 1983). This episodic learning, pursued in response to immediate need, is superior to traditional pedagogical approaches in effectiveness (Richards, 1984; Goldfinger and Bennett, 1983). Knowles (1985) notes that professionals in particular are driven to solve immediate problems and improve overall performance. Based on the assumption that ultimate professional accountability rests with the individual, self-directed learning adds structure, planning, and evaluation to the informal experience while preserving its learning impact. Integrating individual interest and motivation with specific content, self-directed learning allows practitioners to determine their own learning needs, formulate goals, choose learning strategies, and evaluate outcomes. Support services without which, as Dunn notes, "motivation is likely to wane", are a key component to the concept. These can include learning assistance centers, tutors, peers, support groups, computer programs, and telephone referral (Fink, 1983; Knowles, 1985).

Self-directed learning is a challenging prospect for continuing professional education. More research needs to be conducted in the field, but

so far sporadic implementation of the concept has proved promising. Moreover, state approval bodies are moving to recognize self-directed learning activities. In 1980, the University of Southern California's Development and Demonstration Center in Continuing Education for Health Professionals launched a comprehensive project for physicians titled the Self-Directed Learning Project. Among the objectives set at the project's inception were the establishment of self-directed learning methods acceptable to state boards for relicensure, and design of suitable self-directed learning program models. The project employed a tripartite strategy: individualized learning plans, in which the physician outlines his own objectives; information brokering, which links appropriate educational resources with the physicians's project; and peer resource groups that help motivate and support participants in completing their learning plans. Needs assessment in developing the learning plan is of paramount importance in self-directed learning. In the USC program, physicians have a choice of choosing their own topic, identifying learning needs through an objective test, or inviting a practice audit to determine which areas of their practice need development. At times, the process involves patient assessment of care received. Once determined, these needs are incorporated by the physician and an educational specialist in a learning plan, which consists of objectives, strategies to accomplish the objectives, evidence of accomplishment, and validation of accomplishment (Figure 1). Participating physicians are expected to complete each objective within four months. Highly positive evaluations have been received so far from participating physicians (Knowles, 1985).

With modification, the model could be tailored to the educational needs of any profession. Self-directed learning appears particularly suitable to the health care professions. Not only is problem solving a characteristic of

Figure 1

Self-Directed Learning Project for Physicians

University of Southern California

Special Features

*Philosophy of Self-Directed Learning for Physicians

*Objectives of Self-Directed Learning for Physicians

*Information Brokering

*Peer Resource Groups

*Role Expectations

*Needs Assessment

*Individualized Learning Plans

Objectives

Learning Resources and Strategies

Evidence of Accomplishment

Validation of Evidence

health care professionals, but mastery performance, essential to health care practice, is an integral part of self-directed learning (Fiene, 1984; Knowles, 1985). Participants work through the learning plan, which is focused on a particular problem, until the terminal goal is reached. Continuing medical education offices at both the Universities of Texas and Southern Illinois have implemented self-directed learning programs for physicians (Richards, 1984). Southern Illinois added a twist to the concept with the Problem-Based Learning Module (PBLM), a patient simulation in book format. Participating physicians follow a patient problem through successive stages, each encounter serving as

a self-directed learning experience (Osborne, 1984). Kettering Medical Center's School of Medical Technology in Kettering, Ohio, developed what it termed the self-instructional unit (SIU) as a cost-saving alternative for continuing professional education (Figure 2). Unlike the model in which participants design their own learning packages, SIU's are written by the Medical Center's instructors for groups of professionals. Containing a workbook that includes learning objectives, a bibliography, learning activities, and an evaluation form, Kettering has discovered that SIU's not only allow students to proceed at their own comfortable pace, but also that instructors can spend more time providing students with individual assistance (Fiene, 1984).

Considering that self-directed study is a natural, intimate method for professionals to remain current, its formalization into structured learning modules acceptable to licensing boards holds great promise for continuing professional education. Current efforts are a harbinger of the space-free, time-free, focused independent study coveted by continuing professional educators. The major obstacle to self-directed learning appears to be professionals themselves, who, having acquired their stock in trade through years of teacher-directed learning, may experience difficulty in gearing up for new instructional approaches.

LECTURE DELIVERY

Although the oldest form of continuing professional education, the lecture, is antithetical to experiential learning, it has certain advantages not found in some of the newer delivery methods. Since most practitioners were schooled by traditional pedagogy, the lecture is a method with which

Figure 2

Self-Instructional Unit Format

Kettering Medical Center

I. Pretest (Optional)

II. Purpose

III. Audience

IV. Prerequisites

V. Materials Needed

VI. Educational Objectives

VII. Learning Activity List--Educationally sequenced table of contents that guides the student toward mastery of the unit's terminal goal.

VIII. Bibliography

IX. Learning Activity Exercises--The series of learning activity exercises comprise the body of the self-instructional unit. Exercises may be made up of a narrative, procedures/techniques, performance checklists, AV presentations, or a combination of these. Each learning activity exercise ends with a group of study questions for self-review.

X. Evaluation/Posttest

A. Written

B. Practical

XI. Appendix (Optional)

participants are familiar. The instructor's "live" presence has its own unique impact capable of engendering attitudinal change. And, unlike hardware delivery, lecture delivery can provide instant feedback to participants. For a variety of reasons, many adults do not readily accept programmed instruction or the infamous, impersonal "talking heads" of educational television. The personal and spontaneous dimension of the lecture, as well as its proven track record of facilely transmitting new knowledge to the cognitive domain, are its salient features. Add to this the "hidden agenda" imparted through participants' socializing (Wager, 1977; Fink, 1983; Houle, 1981).

Much of the lecture's success depends on the dynamism and knowledge of the instructor. But the lecture has not been a static delivery method clinging solely to classical didacticism. Various modifications of the lecture--including seminars, discussion groups, and journal clubs--have existed for decades. Other additions to the basic lecture concept, emerging from the relatively recent research explosion in psychology, include T-group exercises, role playing, nominal group techniques, and small group analysis of case studies. Structured to include techniques such as these, the lecture can be tailored to recognize the experiences and accumulated skills of learning professionals. The problem is that no matter what participatory techniques the lecture includes, topics are usually offered as a potpourri to participants who ostensibly know intuitively that the program is relevant to their needs. In reality the program may present material irrelevant to participants in a style not conducive to learning. Learning outcomes in this scenario are usually indeterminate. Still, the lecture is a powerful delivery method that should not be dismissed as hackneyed. Houle (1981, pp. 202-203) cited a 1971 study of continuing professional education pharmacy programs indicating that lectures are more effective and cheaper than either correspondence or audiovisual presentations.

CORRESPONDENCE DELIVERY

Correspondence study is an extension of the century old splintering of knowledge into disciplines. Offering modules of knowledge structured in meaningful progression, correspondence study is monitored through various forms of interaction other than direct contact with an instructor. It is one of the oldest forms of continuing education, with contemporary manifestation in modularized formats such as computerized instruction, self-teaching books, and journals with learning units. Under certain circumstances, correspondence study seems to have advantages accruing from its accessibility, but, like the lecture, it is a delivery method suffering from presupposition of learning needs. Typically the format forces the learner to imbibe in all information included in the learning package, and performance outcomes are not addressed. In addition, correspondence study is criticized for its lack of peer support and instructor intervention which could motivate students toward completion. A positive continuing professional education experience with correspondence study, however, is reported by Wilson (1982). To meet the continuing education needs of physicians in remote areas, the University of South Dakota School of Medicine developed a correspondence course on the preterm newborn as a trial balloon for future medical updates to rural physicians. Offered for continuing medical education credit, some 97 percent of 359 participating rural physicians surveyed claimed that they found the format helpful. Ninety-three percent expressed a willingness to participate in another correspondence course, and 70 percent stated that the course changed their behavior in practice. By South Dakota standards, where it is often difficult for physicians to travel vast distances to medical programs, the participation rate was favorable. Too, seminars seldom address topics as narrowly and

specifically as correspondence. And, according to Wilson, the cost of the South Dakota course was less than 1 percent of the total fees involved in attending a conference. Despite the drawbacks of correspondence study, it would appear to be an economical delivery system to self-motivated, geographically dispersed professionals needing narrowly focused updates.

PROFESSIONAL JOURNAL DELIVERY

Professional journals are one of the oldest, and indeed, among the most widely used sources of self-directed continuing education. They offer updates or new information easily retrieved in a convenient format at a considerable cost savings over other delivery systems. The professional journal's advantage in flexibility to the busy professional strapped for time is its real asset. A study cited by DeMuth (1984) found that journal reading was more influential in changing the practice of physicians than formal continuing education. Realizing its impact as a learning tool, editors of many professional journals have improved their publications' readability, format, color, and use of graphics. Among the most important changes have been the inclusion of structured continuing education courses approved for credit. Although the educational effectiveness of journal reading by professionals has long been recognized, it is seldom regarded as acceptable continuing education activity by licensing boards. Structured journal courses have remedied the situation, and today are published in a number of journals for physicians, nurses, physician's assistants, medical technologists, and pharmacists. DeMuth's (1984) study of pharmacists who completed courses offered in The U.S. Pharmacist found that over 90 percent of those who completed the courses did so in order to fulfill the mandatory continuing education requirements in

their state. However, a majority of respondents found the information helped them in practice, especially in communicating with physicians and the general public. The most positive response of the survey came from a question regarding the convenience of the format. If properly designed, journal courses can offer continuing professional education economically and conveniently--but with the same drawbacks as correspondence study. No assessment of learner needs, experience, or performance outcomes is taken into account. Journal courses may have their greatest proponents among those who are content with the fast track to continuing education credit.

AUDIOTAPE DELIVERY

Audiotapes are considered by some of their users to be the ultimate learning tool, although the assessment of most educators would not be nearly as enthusiastic. Excitement about the medium is indicative of how much learners value convenience. Although audiotapes are didactic and non-interactive with no regard for learner needs or outcomes, they are inexpensive and flexible enough to be used simultaneously with other activities. This feature--the use of time that might otherwise be unproductive (while driving or jogging, for example)--has rallied droves of busy professionals to the audiotape banner. An industry of talking books, edited conference proceedings, and digests of research findings has sprouted to meet the demand.

Audio-Digest, a nonprofit organization which has been in business since 1953, produces for distribution to over 150,000 physicians audiotape conference proceedings, seminars, and short courses in eleven different speciality areas of medicine. The corporation's excess funds are plowed into medical school scholarships to the tune of $10.5 million per year. Audio-

Digest executives claim they offer state-of-the-art information to practitioners approximately one year ahead of print (Oakley, 1983).

The growing popularity of audiotapes represents a refreshing egalitarian spirit at work in continuing professional education. Audiotapes are a no-frills, take-it-as-you-can-get-it approach to continuing education highly dependent on learner motivation. They are used in such isolated circumstances that little if any research has been conducted on their effectiveness. Considering that the most popular form of audiotape use is in conjunction with other activity, one can only wonder how garbled the educational message becomes when distorted by visual stimuli.

TELEPHONE DELIVERY

The telephone, a century old invention that seems to have ever-widening application, often has been overlooked as an educational delivery system in favor of more glamorous media. In continuing professional education, it has served as a direct delivery device and as a communication tool in consulting, where learning is a byproduct of the primary mission. The telephone's direct educational application includes the telelecture, through which a speaker can broadcast live to geographically dispersed groups, and the one-on-one delivery of taped information updates germaine to a particular profession. Telelecture allows participant interaction with the speaker, and is often accompanied by print and visual materials mailed in advance to the delivery site. In some states, a permanent telelecture system has been established, usually by a state university (Adamson, 1982; Houle, 1981). Among the more venerated of these statewide systems is the University of Wisconsin's UNEX, established over twenty years ago and today serving 34,000 continuing professional

education participants annually in nursing, social work, x-ray technology, pharmacy, veterinary science, and medicine. UNEX has proved to be a flexible, economical, and an effective delivery system. Unlike most educational television projects, UNEX is cost effective, delivering continuing medical education at a cost of less than $6.00 per participant per contact hour. Audiences range in size from a small handful to hundreds of participants. Interaction with speakers, who phone in from anywhere in the United States, is an essential feature of the system. The real beneficiaries of UNEX are small health care facilities with less than 200 beds, which depend on external providers for continuing professional education (Meyer, 1983).

Purdue in 1979 launched a telelecture program to provide ten contact hours of continuing professional education annually to speech-language and hearing clinicians based in Indiana's school districts. Each district has the opportunity to specify its continuing education needs. Showalter (1983) noted a survey of the program's participants revealing that 87 percent rated the telelecture as excellent, and 78 percent claimed they could apply the material provided immediately to their practices. As for cost savings, it was estimated that the system saved 55 percent over the live seminar method. It is perhaps questionable if the survey results would have been quite as positive had participants been required to sit through more than ten hours of learning via this method.

Telephone delivery is essentially an extension of the traditional seminar, but with the cost advantage of concurrent delivery to multiple locations. Adamson (1982) cited the research of a NASA psychologist who investigated the effect of the absence of a visual component in telephone delivery. As communication channels decrease, the psychologist concluded, as visuals are stripped away, the lack of non-verbal cues creates more formal,

less relaxed interaction, which reduces program time. The psychologist noted, however, that telelecture participants perceive a certain privacy lacking in live seminars or satellite teleconferencing.

Recognizing the disadvantage at which a learner is placed with audio delivery, the South Dakota Medical Information Exchange (SDMIX) audio-teleconference network designed a special technique to optimize telephone delivery's impact on physicians. Termed the "preview, present, and review" technique (Figure 3), the presenter previews his lecture content, presents it in a manner that facilitates discussion, then reviews material covered to stimulate retention. Visual techniques supplementing the audio include meaningful slides changed every two minutes, transition visuals used to spark discussion, and program outlines (Razkowski, 1982). Although SDMIX designed the technique for physicians, a high-density learner group, it would appear to be an effective audio approach for any group of professionals. The techniques used to increase audience awareness of the program's organizational structure and to encourage retention of material are essential for a one-dimensional delivery system to be effective.

For those considering phone delivery over video for economic reasons, it would be advisable to investigate an alternative visual component that can dramatically increase the effectiveness of the audio portion. Known as the "electronic blackboard", the system supplements audio for distance learners with the instructor's blackboard writing duplicated from the home delivery site via dedicated phone line. Developed at the Air Force Institute of Technology in the 1970's, an evaluation of the system in 1981 revealed that the audio-"electronic blackboard" combination was as effective as live delivery, and that it taught 3.46 students at the cost of one student with a live faculty member (Christopher, 1981). It is most suitable to relaying

Figure 3

EDUCATIONAL TELECONFERENCE FORMAT

I. PREVIEW

A. Welcome and Roll Call by Moderator

B. Relevance of Topic to Audience

C. Objectives of Presentation

D. Introduction of Instructor

II. PRESENT

A. Structure of Presentation

B. Participant Involvement

C. Presentation Style

D. Media Utilization

III. REVIEW

A. Moderator Thanks Instructor

B. Review of Key Points

C. Participant Feedback/Evaluation

D. Moderator Ends Teleconference

technical information, however, and precludes the use of demonstration unless they can be conducted live at the remote site.

The University of California's School of Medicine has added a twist to telephone delivery by using it in a competence model instead of an update model. The Professional Competence Assurance Program (PROCAP) identifies deficient areas of a physician's practice through medical audit, and then tailors a program to meet the learning need. To provide feedback, small group teleconferences between consultants and several physician participants are scheduled, the success of which is heavily dependent on the consultant's tact, knowledge, and skill in drawing out participants. Adamson's (1982) survey of fifty-one participants indicated that they found the learning experience more satisfactory than expected, and that most (70 percent) stated they gained knowledge from interaction with other participants in their group. In addition, the physicians appreciated the brevity of the consultation and the fact that no travel was required. Most impressive was a reduction in the enormous cost of individual consultancies.

It would appear that this innovative approach to telephone delivery, using it as a tool to defray costs of performance-based continuing professional education, has promising application where cost is a primary concern.

COMPUTER DELIVERY

Just as the rise of the computer led to its diverse and widespread use in society, so too have computers permeated continuing professional education in a number of ways. Especially in the health care field, computers have enabled information-loaded networks to instantly deliver data to practitioners on a

grand scale. Systems interfacing patient medical records with drug information databases are common, providing learning potential as an auxillilary to their primary function. Braunstein (1983) cited a study in which pharmacists rated the computer a "superior source" of continuing professional education when a drug interaction system was dovetailed with patient medical records. The implication here is significant: that a medium frequently used by practitioners could serve as an effective tool for delivery of continuing education as a corollary to its intended functions. At present, there appears to be a dearth of software that could capitalize on the potential of this phenomenon.

For physicians, the computer has been implemented as a decision-making tool in diagnosis or patient management. Current computer programs offer advice, but lack the educational value of dialogue typically shared in interpersonal consultation between colleagues. As in the situation with pharmacists, the computer has potential as a powerful educational tool for physicians if software could be developed to explain steps in the decision making process rather than simply dispense advice (Shortliffe, 1983).

The delightful wizardry computer technology has developed for educational purposes is destined to increase in sophistication and popularity. Computers have been credited with raising motivational levels, reinforcing learning through rapid response, and providing a private, nonpunitive climate for the slower learner (Heinich, 1982). Computer-based instruction is categorized by its two major applications: computer-managed instruction (CMI), which helps instructors administer and direct the learning process, and computer-assisted (CAI), in which the student interacts directly with the computer. Both are applicable to individualized instruction. CMI, perhaps best illustrated by Control Data Corporation's Plato Learning Management, overcomes tutorial

management problems by monitoring individual students' progress along a learning path. CAI in its early days suffered from boredom-inducing linear programming, which monotonously fed instructions to passive, uninvolved learners (Knowles, 1986). Computer technology's development of branching, however, introduced the exciting concept of interactive instruction to CAI. Branching offers the challenge of pathways, or options leading the learner to discover consequences of choosing those options. Programmed simulations of real-life situations can engender poignant understanding by confronting learners with difficult but risk-free problems. Airline companies use sophisticated simulations for flight crew training, and the technology has been employed to present hypothetical business and pseudo laboratory experiments. A potent educational delivery device is created when CAI is interfaced with videodisc, a medium discussed below (Heinich, Molenda, and Russell, 1982; Knowles, 1986; Knirk and Gustafson, 1986).

The bright promise of computers in instruction is somewhat clouded by their limitations. In spite of dramatic price reductions in computer hardware, computer instruction remains relatively expensive. The design of hardware for educational purposes had not kept pace with its development for business and other applications. Software developed for one system is often incompatible with another. High-quality interactive software is scarce, due in part to the reluctance of commercial developers to produce materials easily bootlegged and of limited marketability. And parochial development of quality instructional software is a painstaking process even for the veteran program designer. Computers, of course, are of value for instructional purposes only so far as the program driving them. Slavish in their obedience, computers hosting linear or inferior interactive programs can be alienating in their lock step control of learning (Heinich, Molenda, and Russell, 1982).

It must be remembered that the computer's application in education has had a meteoric rise, and its evolution in this arena has not yet reached its apogee. Despite its current limitations, the computer's capacity to deliver self-directed, interactive learning, thus overcoming logistical problems of individualized instruction, has been established. No doubt its application for continuing professional education will increase, undergo refinement, and decrease in cost. Perhaps the computer's success as an educational device has been greater in continuing professional education than adult education, since most professionals are problem solvers familiar with technologically refined tools. As the computer generation matures, as hardware develops and becomes more generally available, and as software takes on greater sophistication, continuing professional education is sure to experience the flowering of self-directed learning.

TELEVISION DELIVERY

Television in its various forms, as well as its ostentatious stepchild, videodisc, is the glamour delivery system of continuing professional education. More literature is available on television's application to continuing professional education than any other medium. As could be expected, most of this material is enthusiastic if not ecstatic, and with good reason beyond mere cosmetics. While it is the most expensive of the media discussed, as a delivery system it has established an excellent record--not for any intrinsic qualities, but because of sound instructional design and delivery (Hudspeth & Brey, 1986). The distasteful memory of "talking heads" from twenty years ago belies television's increasing technological sophistication. Now a rich resource for education and training, television's

second generation offers not only over-the-air broadcasts but closed circuit and cable systems which can be linked by satellite relay. Video programs on videotape and videodisc are as available as audio tapes and records. The proliferation of portable video recorders and recording equipment has enabled instructors to create their own instructional materials. The widespread public acceptance of inexpensive video recorders in the home has created a climate for independent study courses augmented by video (Heinich, Molenda, and Russell, 1982). For continuing professional education, television can concatenate large numbers of geographically dispersed groups of professionals in a common interactive learning experience. It can deliver new information much more rapidly than traditional methods. Even the most remote practitioners, with proper equipment, can partake of the latest professional education information. Interaction is provided by mail, phone, or computers, and future systems--such as teletext, videotext, and codex--will add new dimensions to current technologies. At present, distribution systems such as closed circuit, cable, and microwave are used in continuing professional education to overcome broadcast television's coverage limitations.

Satellite Transmission

Satellite signals can be relayed anywhere, and once received, distributed via cable or microwave to the receiving site. Among professional associations in the vanguard of using satellite-linked television to educate its membership has been the American Dietetic Association (ADA). Beginning in 1979, the ADA broadcast three, three-hour continuing professional education programs per year via one-way video supported by two-way audio. Speakers are usually nationally recognized experts who periodically interrupt their presentations to accept questions from remote-site participants. Typically, the ADA

receives 1,600 registrations for a program, which represents an average 7.5 percent return on mailed announcements, a considerable improvement over the usual 1 percent for seminars. The $20 registration fee per program--a requirement for those who wish to receive continuing education credit--is a popular price among a professional group not highly paid, and no doubt accounts for the high participation rate. Ordinarily a three-hour broadcast costs $50,000, or $7.50 per program hour per participant. Presently the ADA reaches approximately 40 percent of its total membership with the system, but the ADA concluded that increasing the number of viewing sites would not be cost effective. However, for those members not reached by the existing system, the ADA produces edited videotapes of its broadcasts and, along with print supplements, markets the packages as self-study kits (Nanberg, 1983).

Cable Television

Cable television, or CATV (community-antenna television) derived its name from the process of using a single antenna to receive broadcast signals and transmit them along feeder lines to receiving stations. The advantages of CATV are its clear signal and its capability to relay signals from receiver to sender, making it an interactive instructional medium (Heinich, Molenda, and Russell, 1982). In British Columbia, where continuing professional education would be impossible for remote learners without distance delivery, professionals are served through British Columbia's KNOW cable network. The University of Victoria's Department of University Extension uses the network to broadcast programs developed at the institution's eight professional schools. Since nearly 90 percent of all British Columbia's scattered population subscribes to cable, television is the optimal delivery system. Originating at University Extension Studios, broadcasts are beamed to the KNOW

network center in Vancouver and uplinked to a satellite. The system adds an audio teleconferencing bridge which enables participants to converse with each other and the instructor concurrently. Since one of the problems of educational television is that participants frequently lose information, educational programs are repeated and also packaged into self-instructional programs. Interestingly, when the University stopped broadcasting to specific sites and began transmitting directly into participant's homes, interaction with the instructor dropped significantly. With the addition of the audio bridge enabling students to interact with each other as well as the instructor, participation rates rose to their former level. Completion rates for participants are high--from 77 to 99 percent--attributable in part to the support services the University extends to distance learners (Haughey and Murphy, 1984; Haughey and Murphy, 1983).

Closed-Circuit Television

In the closed-circuit television (CCTV) delivery system, sender and receiver are physically linked by dedicated wire. Unlike television broadcasts using airwaves, transmission costs increase as the coverage area expands. The most common form of instructional television on college campuses, CCTV is particularly useful where large numbers of students must be taught by a limited number of faculty members. It offers freedom and privacy unmatched with other television delivery, an important consideration in continuing professional education.

A good example of a CCTV system is Purdue's IHE Telecommunication System. Linking all of Indiana's state universities and their branch campuses, the system features a two-way audio component that enables viewers to communicate with viewers at other broadcast sites as well as the program speaker. In

operation since 1969, the system has delivered 35,000 live and 48,000 videotaped contact hours of credit, non-credit, and continuing professional education programs. In testing participants through the years, Purdue has discovered no significant difference in test achievement between live classroom and remote participants. Cost analysis of IHE reveals that it delivers programs to thirteen times as many participants as a seminar at one-fifth the cost (Showalter, 1983).

Microwave Transmission

The least well-known of television's delivery systems is also one devoted exclusively to educational broadcasting. Over a quarter-century ago, the Federal Communications Commission set aside certain VHF and UHF channels in the microwave band for instructional use by educational institutions. Dubbed ITFS (Instructional Television Fixed Service), microwave has one major drawback: microwave frequency signals travel a line-of-sight pattern and cannot reach receivers beyond sightline of their transmission tower. Coverage is thus limited, and may account for the unpopularity of ITFS. The advantages of the transmission system are its privacy--ordinary sets cannot access its frequencies--and the costs of ITFS equipment and operation, which are lower than broadcast television's. Although ITFS has been growing sluggishly since its inception, and will undoubtedly increase in popularity as now available frequencies become saturated, presently only half the states employ ITFS systems. Aside from its application by public and parochial schools in large metropolitan areas, ITFS in higher education has been used effectively to external graduate and professional school education. In continuing professional education, two-way ITFS systems at engineering and medical schools provide updates to practicing professionals in the field. The

most technically sophisticated examples of ITFS, in fact, are found in continuing professional education (Heinich, Molenda, and Russell, 1982).

Videotape

Videotape offers the potential of greater educational program precision, since programs can be staged, refined, and edited before final production. A good "take" can be shown over and over, avoiding instructor burnout, and demonstrations germaine to the lecture can be spliced onto the tape. A videotape, in fact, can be tailored to each new audience, although some educators argue that the lack of spontaneity with videotape is its main drawback (Polk, 1984). In the Pacific Northwest, where nurses in rural areas find access to continuing professional education difficult, the Intercollegiate Center for Nursing Education (ICNE) in Spokane responded with videotaped programs broadcast via cable television. In its first attempt, ICNE aired a six-hour program about aging, accompanied by a workbook for participants. The program was repeated three times each week by four different cable companies in the Pacific Northwest. For those participants who were not cable subscribers, arrangements were made with each cable company for a central viewing site. Sixty-four percent of the program's eighty-six registrants completed the course; probably the novelty of the medium precluded greater participation. In a summary evaluation, 90 percent of those who completed the course stated they liked the delivery system, and 85 percent claimed they benefited from the content. Most, however (79 percent), stated they had to watch each installment twice to avoid missing important information. Although the first attempt lost money, ICNE followed up with a videotape series on alcoholism and one on childhood disease. The association hoped to continue its effort with at least one series per year, each to be

available for rental, the proceeds from which could be applied to additional program development (Clark, 1984).

The common complaint against videotape--its inability to provide direct interaction--can be obviated through "talk-back" television. Five years ago, the University of Connecticut's School of Allied Health Professions offered a five-evening "Clinical Dietetics Update" videotaped course at six branch campuses of the university. Instead of the usual non-interactive videotape format, the instructor was available at the broadcast site to answer questions. In a follow-up survey, 80 percent of those who completed the course indicated that distance was the major factor impeding their participation in a continuing professional education program, while 82 percent stated that propinquity was the most important factor in attending. Eighty-three percent claimed they would enroll in another "talk-back" television course if given the opportunity, but 43 percent indicated they would prefer live lecture (Polk, 1984). This confirms the findings of similar surveys highlighting the importance of accessibility and interaction in any delivery system.

Videodisc

The videodisc, a recent addition to video storage technology, has been hailed as a breakthrough in instructional telecommunications (Tucker, 1984). Each disc contains a 54,000 frame capacity, and with a stop-frame and random access capability, the videodisc can store, index, and deliver combinations of print, still pictures, or television programming. Interfaced with a microcomputer--now built into some videodisc players--the videodisc can serve as an interactive learning tool, capable of regulating program speed and difficulty according to learner needs. At present a variety of available

systems allow learner interaction via light pen, voice response, or keyboard, to which the system responds by "branching" to the appropriate video image. Interactive videodisc programs, properly designed, are instructional marvels: real-life situations can be dramatically simulated with greater time available for learner response than under real circumstances and certainly with less risk. Understandably, such systems have been effectively used in pilot training and laboratory experiments (Heinich, Molenda, and Russell, 1982; Tucker, 1984; Knirk and Gustafson, 1986).

Although the educational potential of instructional videodisc systems has been proved, videodisc technology currently presents problems in its instructional application. First, unlike videotape, the medium is incapable of recording off the air. Second, several technically different, incompatible playback systems are competing for market primacy. And third, while mass-produced, home entertainment videodiscs are cheaper to manufacture than videotape, limited production costs for videodisc are prohibitive because of the expense involved in producing a master disc. The cost skyrockets when the video component is interfaced with computer capability to produce an interactive program. If revisions to the program are necessary, the entire disc must be remastered and the computer program reworked. These costly conundrums have relegated interactive videodisc's application thus far to prototype experimentation and training departments of wealthy corporations. The medium's progress beyond this stage will require collaboration between the electronics, computer, media distribution, television, and telecommunications industries. Presently, the promise of ubiquitous electronic learning stations delivering a rich array of educational resources to individual learners is no more than fantasy (Tucker, 1984; Heinich, Molenda, and Russell, 1982; Knirk and Gustafson, 1986).

Television Delivery: Conclusions

The days of doubting television's impact as an instructional medium are long gone. Twenty years ago, Chu and Schramm (1967) pointed to the hundreds of experiments and comparisons proving the effectiveness of instructional television. Knirk and Gustafson (1986) however, offer a few caveats to those considering using television as a learning tool:

- The use of active student response in ITV design improves learning.
- Instructor follow-up of an ITV lesson increases learning more than viewing a lesson twice or with no follow-up.
- There is little evidence to suggest that color will improve learning from ITV.
- Subtitles will improve learning from ITV especially when the original program was not well designed.
- There is no evidence to prove that large-sized screens will improve learning from television.
- ITV appears to be equally effective with any size group.
- Notetaking while viewing ITV is likely to interfere with learning unless time is provided for notetaking.
- Liking television is seldom correlated with learning from ITV.
- Most students would prefer a live teacher to a television teacher for most subjects.

Like any other delivery medium, television is not without its disadvantages and these are related to remoteness and expense. Televised delivery of instruction is not conducive to skills development, although it is possible to combine small group skill sessions with broadcasts. It does not promote the legendary "hidden agenda" of participant interaction, and frequently participants are reluctant to voice opinions or questions, even though involvement is regarded as an essential feature of continuing professional education.

Poor quality production is often cited as a prime culprit in delivery, but less well documented is the effectiveness of television hardware at the viewing site. In an experiment conducted with professional designers at Florida State University's Center for Professional Development and Public Service, it was discovered that camera techniques and manipulation of receiver sets can increase a program's impact on the viewer. The optimal arrangement was to mount a monitor no farther away than six feet from each participant. In focusing on instructor demonstrations, the camera fixed on an "over the shoulder" shot of the instructor. Participants were thus presented with a powerful visual image that "seemed to command. . . attention for long periods with less observable satiation and impatience than other programs without such visual images" (Grosslight, 1985). Participants rated the quality of instruction and coverage of topics higher than a live version of the same program. Though this experiment was conducted on a professional group requiring careful demonstration of dexterous skills, the techniques employed could have equal effectiveness with similar demonstrations for other professions.

The complex technology endowing television with its many advantages as an instructional medium is also its Achilles' Heel. Television is expensive. In few instances has instructional television delivery proved to be cost-effective without being shored up by outside funds.

High costs, for example, have prevented the establishment of a health education television network. A growth industry peopled by a variety of professions requiring continuing professional education, the health care business would seem to be particularly suitable to a common network. But a study conducted by the American Hospital Association concluded that the demand was not great enough to justify the considerable financial risk. The problem

with current ad-hoc networking is that fees for reception have quadrupled in the past few years. Consequently, only organizations with large memberships can afford to broadcst on a cost-recoverable basis (Nanberg, 1983). Dunn (1985) notes, however, that while expensive to implement, costs diminish as the number of participants rises. He furnishes an example of a six-hour seminar for 160 teachers in Britain costing $100 per participant, while a lengthier television update for 33,000 pharmacists cost only $6.00 per participant.

Despite its drawbacks, television will continue to extend learning to professionals in the field, especially through closed distribution systems such as CCTV, ITFS, and satellite (Heinich, Molenda, and Russell, 1982).

Television has particular value to the growing number of professionals who place accessibility to continuing professional education above other factors. Just as television's rise liberated education from the confines of the classroom by bringing a potentially effective educational medium into the home, so too have the advent of cable and inexpensive video recorders lengthened the arm of educational delivery. The use of television in continuing professional education is in its infancy, and consequently has been beset by growing pains. Because of its linear nature, television is a limited medium which does not allow the learner much in the way of reflective thinking. Television's use as an educational tool is not intended to replace live seminars or print, but to provide convenience to the distance learner and a context for print's intellectual content. If the past decade is a harbinger of the future, then the future for television in continuing professional education appears bright indeed. Quality in programming has improved dramatically with greater integration of learning theory and technology. An instructional system has emerged from what once was considered a novelty.

Technology in the offing, including two-way cable, codex systems, high-resolution television, and teletext will create new learning possibilities for continuing professional education exciting to contemplate.

SUMMARY

Continuing Professional Education has a powerful ally in instructional technology. Advances have enabled thousands of previously educationally underserved professionals to be updated, a fortuitous circumstance at a time when the need by professionals for continuing learning never has been greater.

The future success of any delivery system in continuing professional education--be it lecture, print, or interactive video--depends on its integration of interaction, skills development, individualization, and self-directedness into the learning experience (Knowles, 1986). As yet, no simple or clearcut guidelines are available to follow in selecting an appropriate instructional delivery system for professionals. Figure 4 lists the advantages and disadvantages to learners of each delivery system outlined in this paper. Note that traditional "In Class On-Site" delivery offers a variety of instructional approaches while other delivery systems are better suited to the distance learner.

Questions, sometimes complex questions, must be answered before prudent selection is possible--for what professional group is the delivery system intended? Are they geographically dispersed, or centrally located? Are needs assessments involved, and should outcomes be assessed? What is the group's motivational level? What level of sophistication in technology can they afford? Can the chosen delivery system be supported with adequate services? As the literature indicated, time and expense are of major concern to most professionals. The best available system sometimes must be sacrificed to accessibilility and economic considerations. Once these boundary lines are drawn, an effective learning climate can be established within the parameters.

Figure 4

Advantages of Educational Delivery Systems

	In class On-site	Corresp.	Prof. Journal	Audio-tape	Computer	Phone	Video-tape	Video-disc	Broadcast Television
Interactive	X				X	X		X	X
Personalized instruction	X								
Self-pacing	X	X	X	X	X		X	X	
Accessible		X	X	X	X	X	X		X
Flexible/convenient		X	X	X	X		X	X	
Eliminates time constraints		X	X	X	X		X	X	
Eliminates place constraints		X	X	X	X		X	X	X
Low cost		X	X	X		X	X		
Access to nat'l experts						X			X
Far reaching		X	X	X	X	X	X	X	X
Transportable		X	X	X			X	X	
Re-usable		X	X	X	X		X	X	
Easy to use	X	X	X	X					X

Note: Adapted from S. Spencer, "A Model for Selecting Distance Education Delivery Systems". Continuum, 50 (Autumn, 1986): 143-152.

References

Adamson, T.E. and D.S. Guillion. "Small Group Teaching Via Telephone in Continuing Medical Education." MOBIUS, 2 (October, 1982): 13-19.

Bennett, N.L. and R.D. Fox. "Learning Style in Continuing Medical Education." MOBIUS, 4 (October, 1984): 89-92.

Braunstein, M.L. "Applications of Computers in Pharmacy." MOBIUS, 3 (April, 1983): 37-39.

Brookfield, S.D. Understanding and Facilitating Adult Learning. San Francisco: Jossey-Bass, 1986.

Broski, D. and S. Upp. "What Allied Health Professionals Want from Continuing Education Programs: A Study of Five Disciplines." Journal of Allied Health, 8 (Spring, 1979): 24-31.

Christopher, R.G. and A.L. Milam. Teleteach Expanded Delivery System Evaluation. Wright-Patterson Air-Force Base, Ohio: The Air Force Institute of Technology, 1981. (ERIC Document Reproduction Service Number ED 244 583).

Chu, G.C. and W. Schramm. Learning from Television: What the Research Says. Stanford, CA: Institute for Communication Research, 1967.

Clark, C.E. and T.L. Cleveland. "The Media and the Mode: Alternate Ways of Offering Continuing Education." The Journal of Continuing Education in Nursing, 15 (May, 1984): 168-172.

Clark, H., T.A. Wadden, K. D. Brownell, S.G. Gordon, and R.D. Tarte (1983). "Sources of Continuing Education for Behavior Therapists: The Utility of Journals, Conferences, and Other Information Sources." Behavior Therapist, 6 (2): 23-26.

DeMuth, J.E. and M.H. Weinswig. "Learners' Evaluations of an Accredited Continuing Education Course in a Pharmacy Journal." MOBIUS, 4 (April, 1984): 12-19.

Dunn, W.R. and D.D. Hamilton. "Competence-Based Education and Distance Learning: A Tandem for Professional Continuing Education." Studies in Higher Education, 10 (3): 277-287.

Fiene, M.A., M. Fannon, S. Drewry and M.A. Spahn (1984). "Development of Professional Competence Via Self-Instructional Clients." Journal of Allied Health, 13 (2): 124-129.

Filer, L.J. and E.F. Calesa. "Multi-Media Education About Infant Nutrition for Physicians." Journal of the American Dietetic Assocation, 72 (4): 404-406.

Fink, D.R. "Outstanding Examples of Innovative Methods." MOBIUS, 3 (October, 1983): 70-77.

Goldfinger, S.E. and N.L. Bennett. "Sub-Rosa Continuing Medical Education." MOBIUS, 3 (October, 1983): 7-9.

Grosslight, J. "Video Instruction and a Welcomed Change in Continuing Education." T.H.E. Journal, 12 (March, 1985): 87-88.

Haughey, M.L. and P.J. Murphy. The Continuing Professional Education Interactive Satellite Interface. Paper presented at the Joint Conference of the Northwest Adult Education Association and Alaska Education Association, Anchorage, Alaska, May, 1983 (ERIC Document Reproduction Service No. ED 239 598).

Haughey, M. and P.J. Murphy. Professional Continuing Education for Rural Teachers: Promising Prospects for the Future. Victoria, B.C.: University of Victoria, 1983. (ERIC Document Reproduction Service No. ED 238 614).

Haughery, M.L. and P.J. Murphy. "Using Higher Tech: Continuing Professional Education By An Interactive Satellite System." Improving College and University Teaching, 32 (4): 191-194.

Heinich, R., M. Molenda, and J.D. Russell. Instructional Media and the New Technologies of Instruction. New York: Wiley, 1982.

Houle, C. Continuing Learning in the Professions. San Francisco: Jossey-Bass, 1981.

Hoyt, D.P. and D.W.M. Frye. The Effectiveness of Telecommunications as an Educational Delivery System. Manhattan, KS: Kansas State University Office of Education (ERIC Report No. ED 070 318).

Hudspeth, D.R. and R.G. Brey. Instructional Telecommunications: Principles and Applications. New York: Praeger, 1986.

Knirk, F.G., and K.L. Gustafson. Instructional Technology: A Systematic Approach to Education. New York: Holt, Rinehart and Winston, 1986.

Knowles, M.S. "Applications in Continuing Education for the Health Professions." MOBIUS, 5 (April, 1985): 80-100.

Knowles, M.S. "How the Media Can Make It or Bust It in Education." In Using Technology in Adult Education, edited by D. G. Gueulette, 4-5. Washington: AAACE, 1986.

Meyer, T.C. "Teleconferencing as a Medium for Continuing Education of Health Professionals: A Fifteen Year Perspective." MOBIUS, 3 (April, 1983): 73-79.

Nanberg, D.W. "The Application of Satellite Television Broadcasting for Continuing Professional Education." MOBIUS, 3 (April, 1983): 56-63.

Oakley, C.L. "Audiotapes in Continuing Medical Education." MOBIUS, 3 (April, 1983): 80-85.

Osborne, C.E. "Comparing the Results of a Traditional One-Day Continuing Medical Education Conference to Self-Directed Learning." MOBIUS, 4 (October, 1984): 66-71.

Polk, M.R. "Talk-Back Television: Continuing Education for the 1980's." Journal of the American Dietetic Association, 84 (1): 75-77.

Raszkowski, R.R. and A.G. Chute. Guidelines for Effective Teleconference Presentation in Continuing Medical Education. Paper presented at the Issues in Higher Education Conference, Atlanta, Georgia, Maub, 1982 (ERIC Document Reproduction Service No. ED 224 469).

Richard, N.K. "Physician Learning and Individualized CME." MOBIUS, 4 (October, 1984): 165-170.

Schon, D. The Reflective Practitioner. New York: Basic Books, 1983.

Shortliffe, E.H. "Problems in Implementing the Computer for Continuing Education." MOBIUS 3, (April, 1983): 52-55.

Showalter, R.G. Educational Teleconferencing: Continuing Professional Education in Speech-Language Pathology and Audiology. Paper presented at the Congress of the International Association of Logopaedics and Phoniatrics, 7th, Edinburgh, Scotland, August 14-18th, 1983. (ERIC Document Reproduction Service No. ED 250 865).

Spencer, S. "A Model for Selecting Distance Education Delivery Systems." CONTINUUM, 50 (Autumn, 1986): 143-152.

Tucker, R.Y. "Training Technologies 83--A Personal View." In Education, Training, and the New Technologies, edited by J. Tucker, 87-92. New York: Nichols, 1984.

Wager, W.W. "Instructional Technology and Higher Education." Instructional Design: Principles and Applications, Edited by L.J. Briggs, 395-419 Englewood Cliffs, NJ: Educational Technology Publications, 1977.

Wilson, A.L., L.R. Wellman, L.J. Fenton and D. Witzke. "Development of a Correspondence CME Course for Rural Physicians." Journal of Medical Education, 57 (August, 1982): 635-637.

Zingale, D. "The Promise of Television in the Continuing Education of Mental Health Practitioners." Health Education, 17 (February, 1986): 18-21.

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